

(19)日本国特許庁 (JP)

## (12) 公開特許公報 (A)

(11)特許出願公開番号

特開平7-12868

(43)公開日 平成7年(1995)5月

(51)Int.Cl.<sup>6</sup>

G 0 2 F 1/1345

G 0 9 G 3/36

識別記号

序内整種番号

P I

技術表示

審査請求 未請求 請求項の数 6 O.L (全 6)

(21)出願番号

特願平5-273614

(22)出願日

平成5年(1993)11月1日

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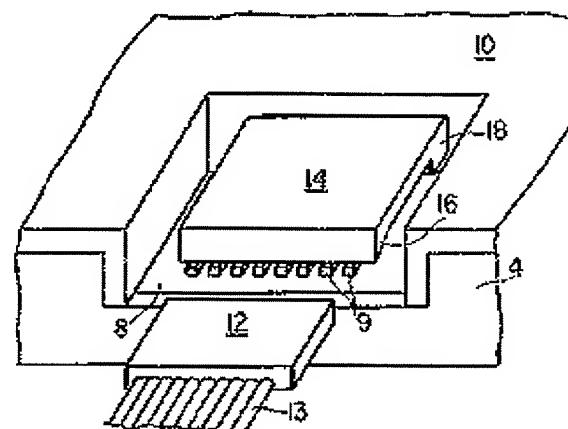
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(54)【発明の名称】 液晶表示器

## (57)【要約】

【目的】 この発明の目的は、静電気によるドライバICの破損を防止するとともに、外部からの負荷及び圧力によるコネクタ及び基板の破損を防止できる液晶表示器を提供することにある。

【構成】 液晶表示器1は、支持枠4、支持枠に接着される液晶パネル2及び回路基板8、及び回路基板を覆うモールド10を備えている。回路基板には、液晶を駆動するためのドライバIC、及びドライバICと電気的に接続されたコネクタピン9が設けられ、モールドには、コネクタピンに対向してモールドと一体に形成されたストップ14が設けられている。ストップはコネクタピン



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## 【特許請求の範囲】

【請求項 1】 支持枠と、

上記支持枠に接着され、表示画面を構成する液晶パネルと、

上記液晶パネルに重ねて上記支持枠に接着され、上記液晶パネルを駆動する回路基板と、

樹脂で形成されているとともに上記回路基板を覆うように上記支持枠に取り付けられたカバーと、

上記回路基板上に取付けられた第1コネクタと、

上記カバーと一体に形成されて上記第1コネクタと対向して位置し、上記第1コネクタに第2コネクタが接続された際、上記第2コネクタの接続状態を保持するとともに上記第2コネクタの接続方向と交差する方向への上記第2コネクタの移動を規制する規制手段と、を備えていることを特徴とする液晶表示器。

【請求項 2】 上記規制手段は、上記回路基板と対向して位置するとともに上記第2コネクタを上記回路基板との間で挟持するストッパを有していることを特徴とする請求項1に記載された液晶表示器。

【請求項 3】 上記ストッパは、上記第2コネクタの上記第1コネクタからの抜けを防止する第1爪と、上記第2コネクタの接続方向と交差し且つ上記回路基板と略平行な方向への移動を規制する一対の第2爪と、を備えていることを特徴とする請求項1に記載された液晶表示器。

【請求項 4】 支持枠と、

上記支持枠に接着され、表示画面を構成する液晶パネルと、

上記液晶パネルに重ねて上記支持枠に接着され、上記液晶パネルを駆動する回路基板と、

上記回路基板を覆うように上記支持枠に取り付けられたカバーと、

上記回路基板上に取付けられた第1コネクタと、

上記カバー及び回路基板の一方に固定されて上記第1コネクタと対向して位置し、上記回路基板のグランドに接続されているとともに導電性を有し、上記第1コネクタに第2コネクタが接続された際、上記第2コネクタの接続状態を保持するとともに、上記第2コネクタが上記第1コネクタに接続されていない状態で上記第1コネクタと電気的に導通する規制手段と、を備えていることを特徴とする液晶表示器。

【請求項 5】 上記規制手段は、上記回路基板と対向し

【0001】

【産業上の利用分野】この発明は、ワードプロセッサー等のパーソナルコンピュータの表示装置として用いられる液晶表示器に関する。

【0002】

【従来の技術】近年、ワードプロセッサー等のパーソナルコンピュータのコンパクト化、軽量化の要求が高まっている。この要求に伴い、これらの装置に組み込まれる液晶表示器の薄型化、軽量化が必要とされている。

【0003】液晶表示器は、一般に、金属製の外枠、液晶パネル、回路基板、サイドライト、及び液晶駆動用ドライバIC等を装着し、その裏面に樹脂製のカバーを備える。液晶表示器の薄型化及び軽量化は、比較的薄なT.A.B (Tape Automated Bonding) をドライバとして回路基板に実装することにより有利に達成できる。

【0004】また、液晶表示器に含まれる回路基板は、外部の装置から液晶駆動信号を供給するためコネクタピンが設けられている。このコネクタピンに外部装置からフレキシブルケーブルを介して導出ソケットが接続されている。

【0005】

【発明が解決しようとする課題】液晶表示器は、薄型化、軽量化が望まれる方面、外部からの圧力や負荷して充分な機械的強度を備えている必要がある。コネクタピンにはソケットの着脱時に大きな負荷するとともに、接続後にソケット及びフレキシブルケーブルを介して大きな負荷が作用する場合がある。また、負荷が過大な場合には、コネクタピンはもしくは回路基板も損傷を受ける虞がある。

【0006】また、液晶駆動回路は、一般にCMOS駆動用ドライバICを多く含んでいる。そのため、人手の接触による静電気、或いは運搬中に発生する静電気によりドライバICが破損する。

【0007】この発明は、以上の点に鑑みなされ、その目的は、静電気によるドライバICの破損するとともに、外部からの負荷及び圧力によるタッカ及び基板の破損を防止できる液晶表示器を提供することにある。

【0008】

【課題を解決するための手段】この発明によれば、支持枠と、上記支持枠に接着され、表示画面を構成す

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と交差する方向への上記第2コネクタの移動を規制する規制手段と、を備えていることを特徴とする液晶表示器が提供される。

【0009】また、この発明によれば、支持棒と、上記支持棒に装着され、表示画面を構成する液晶パネルと、上記液晶パネルに重ねて上記支持棒に装着され、上記液晶パネルを駆動する回路基板と、上記回路基板を覆うように上記支持棒に取り付けられたカバーと、上記回路基板上に取付けられた第1コネクタと、上記カバー及び回路基板の一方に固定されて上記第1コネクタと対向して位置し、上記回路基板のグランドに接続されているとともに導通性を有し、上記第1コネクタに第2コネクタが接続された際、上記第2コネクタの接続状態を保持するとともに、上記第2コネクタが上記第1コネクタに接続されていない状態で上記第1コネクタと電気的に導通する規制手段と、を備えていることを特徴とする液晶表示器が提供される。

【0010】

【作用】この発明の液晶表示器によれば、回路基板上に設けられた第1コネクタに接続された第2コネクタは、回路基板を覆う樹脂製のカバーと一緒に形成され且つ第1コネクタに対向して取付けられた規制手段によってその接続方向と交差する方向への移動が規制される。この規制手段は、第2コネクタの抜けを防止するための第1爪と、第2コネクタの上記交差する方向で且つ回路基板と略平行な方向への移動を防止する一対の第2爪と、を備えている。そして、回路基板と規制手段との間に第2コネクタを挟持することにより第2コネクタの上下方向への移動を規制し、第2爪によって左右方向への移動を規制している。

【0011】また、規制手段をカバーと一緒に形成することにより、フレキシブルケーブルを介して第2コネクタに伝達される負荷や圧力が直接的に第1コネクタに伝達することができなく、回路基板や第1及び第2コネクタの破損を防止することができる。

【0012】また、この発明によれば、規制手段は導電材料で形成され、カバー或いは回路基板側に取付けられて回路基板のグランドに接続されている。そして、規制手段は、第2コネクタが第1コネクタに接続されていない状態で、第1コネクタと電気的に導通する構造を有している。従って、回路基板上の電子部品に電気的に接続された第1コネクタは、第2コネクタが接続されていな

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の支持棒4を備えている。支持棒4には、表示画成する液晶パネル2と、サイドライトユニット6液晶パネル2を駆動する駆動回路を構成する回路子部品を搭載した回路基板8と、が重ねて装着され、回路基板8上には、電子部品を覆うカバーの樹脂製のモールド10が重ねて配置される。

【0014】回路基板8と液晶パネル2との間にライバICとしての回路しないTABがフレキシブルケーブル11として接続されている。また、回路基板8とモールド10との間に位置しているコネクタピン9には、第2コネクタとしてのト12が矢印X方向に沿って接続可能となっていて、ソケット12は、駆動信号の供給源としての回路子部品にフレキシブルケーブル13を介して接続している。

【0015】フレキシブルケーブル13、ソケット12、コネクタピン9、及び電子部品を介して液晶号が外部装置からライバICに供給されると、モールド2が駆動信号に従って駆動され、サイドライ透光によって液晶パネル2に画像が表示される。

【0016】液晶表示器は、薄型化、軽量化が望む一面、充分な機械的強度を備えている必要があるに、コネクタピン9には、ソケット12の着脱時に大きな負荷が作用する。そのため、本液晶表示器1は、ソケット12の移動を規制する端としてのストッパ14を備えている。以下、ストップについて詳細に説明する。

【0017】図3、及び図4に示すように、第1例に係るストッパ14は、モールド10と一緒にこれコネクタピン9に對向するように配置されている。ストッパ14は、ソケット12をコネクタピン9に接続する状態で、ソケット12の上面に接触するようにされ、ソケット12を回路基板8との間に挟持してこの時、ソケット12の下面は、回路基板2に接続され、ストッパ14及び回路基板2によってソケット12の接続方向Xと交差する上下方向への移動を規制する。

【0018】また、ストッパ14は、ソケット12の接続方向Xへの抜けを防止するための第1爪16と、ソケット12の接続方向Xと交差する方向で且つ回路基板2と略平行な方向、即ち左右方向への移動を規制する

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し、ソケット12をコネクタピン9に接続する場合、或いはソケット12をコネクタピン9から引き抜く場合には、ストッパ14が一旦曲げられてソケット12が脱着される。

【0019】以上のように、モールド10と一体に形成されたストッパ14によってソケット12の上下左右方向への移動を規制することにより、フレキシブルケーブル13を介して外部からソケット12に与えられる負荷や圧力がコネクタピン9または回路基板8に直線的に作用することなく、ストッパ14及びこれと一体のモールド10全体で負荷を受け止めることができる。その結果、コネクタピン9及び回路基板8が過大な負荷を受けることがなく破損を防止できる。また、ストッパ14をモールド10と一体に形成する構成とすることにより、液晶表示器1の製造工程が簡略化され、製造コストが低減される。

【0020】次に、第2の実施例に係るストッパについて図5乃至図7を用いて説明する。尚、基本的な構成は上記第1の実施例と同じであるので、第1の実施例と同一の部分については同一符号を用いて説明を省略し、第1の実施例と異なる部分についてのみ説明する。

【0021】図5及び図6に示すように、ストッパ15は、金属などの導体を折り曲げて形成され、その基端部15bは回路基板8にねじ17によって固定されて回路基板8のグランドに接続されている。ストッパ15は、基端部15bからコネクタピン9の上方を通ってコネクタピン9に沿って延び、コネクタピン9の先端部付近でコネクタピン9から離れるように上方に折り曲げられている。この折り曲げ部15cは、ストッパ15のバネ作用によってコネクタピン9方向に押し付けられている。また、ストッパ15は、その側端部から下方に突出した一对の爪15dを備えている。

【0022】図7は、図5に示すストッパ15を矢印A方向から見た側面図を示している。コネクタピン9にソケット12が接続されていない状態（実線で示す状態）において、ストッパ15の折り曲げ部15cがコネクタピン9に接触している。そのため、コネクタピン9はストッパ15を介して回路基板8のグランドに接続されている。

【0023】また、コネクタピン9にソケット12が接続されると、ストッパ15は点線で示すように上方に押し上げられ、ソケット12は回路基板8とストッパ15

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ソケット12は、ストッパ15のはね作用によってそれが押さえ付けられることにより、抜け難くされて抜け方向への移動を規制している。このように、ストッパ12の接続状態を保持することにより、外部からソケット12に与えられる負荷によるコネクタピン9回路基板8の破損を防止できる。

【0025】また、コネクタピン9にソケット12が接続されていない状態において、コネクタピン9はストッパ15を介して回路基板8のグランドに接続される。そのため、人体の接触によって与えられる静電気や運搬中や保存中に生じる静電気がコネクタピン9を介してドライバICに伝達されるとがなく、によるドライバIC等の電子部品の破損を防止できる。

【0026】尚、この発明は、上述した実施例におけることなく、発明の要旨を変更することなく適用される。例えば、第2の実施例におけるストッパ15は、回路基板8を覆うモールド10に取付けられる。この場合、ストッパ15は、例えばモールド10の内面に形成されたシールド層を介してグランドに接続される。

【0027】

【発明の効果】以上説明したように、この発明の示器によれば、ソケットがコネクタピンに接続されている状態で、ソケットの接続方向と交差する方向への移動を規制するために、コネクタピンに対向してストッパ15と一体に形成されている。従って、フレキシブルケーブルを介して外部装置からソケットに伝達されるストッパ15及びモールドによって受け止められたコネクタピンや回路基板に過大な負荷が作用することなく、コネクタピンや回路基板の破損を防止できる。

【0028】また、他の発明によれば、ストッパ15は、金属などの導体で形成されているとともに回路基板8のグランドに接続されており、コネクタピンにソケット12が接続されていない状態でコネクタピンに接触する構成である。従って、ソケットが接続されていない場合は、コネクタピンがグランドに短絡されている。そのため、作業中における人体の接触により伝えられる静電気及び運搬中や保存中に生じる静電気がコネクタピン9に与えられる場合には、静電気は、ストッパ15を介してグランドに逃げるため、静電気が回路基板8上に実装された電子部品に到達されるとがなく、電子部品の静電気による破損が防止できる。

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【図5】図5は、この発明の液晶表示器に含まれる第2の実施例におけるストッパを含む接続部分を示す概略図。

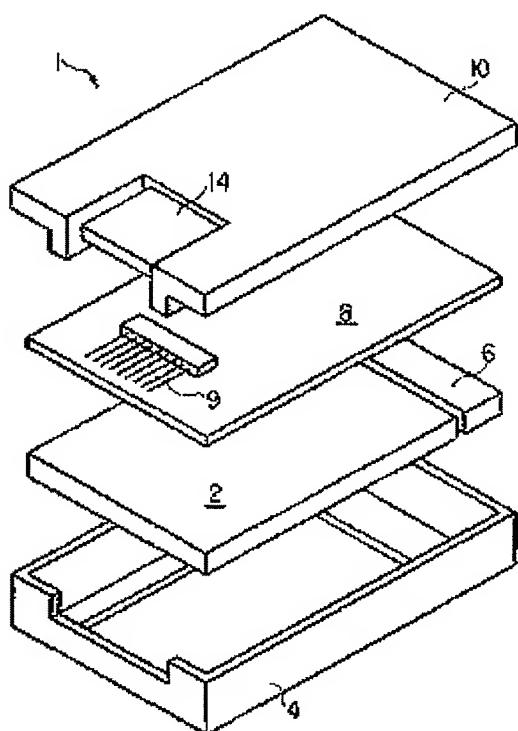
【図6】図6は、図5のストッパによってコネクタの接続状態を保持している状態を示す概略図。

【図7】図7は、図5のストッパを示す側面図。

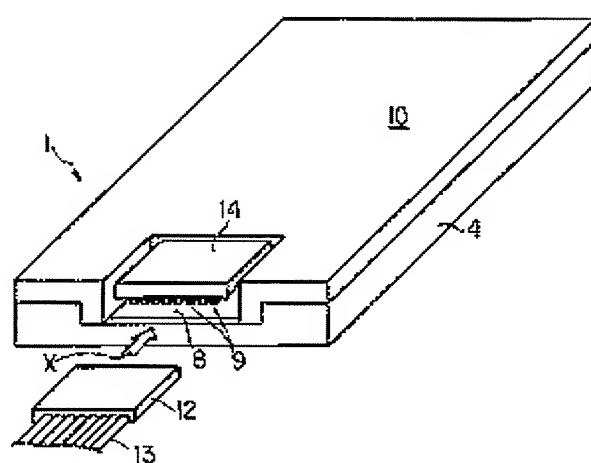
\* 【符号の説明】

1…液晶表示器、2…液晶パネル、4…支持枠、  
路基板、9…コネクタピン、10…モールド、11…  
ケット、13…フレキシブルケーブル、14…  
ストッパ

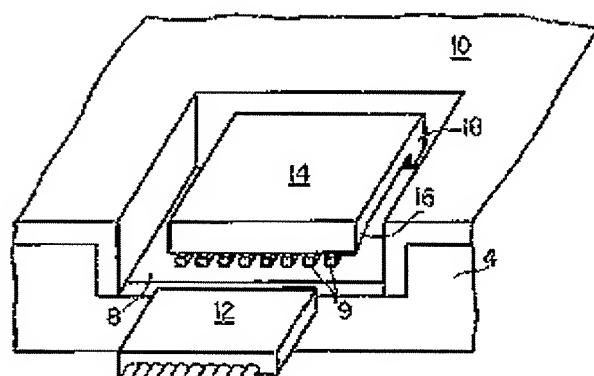
【図1】



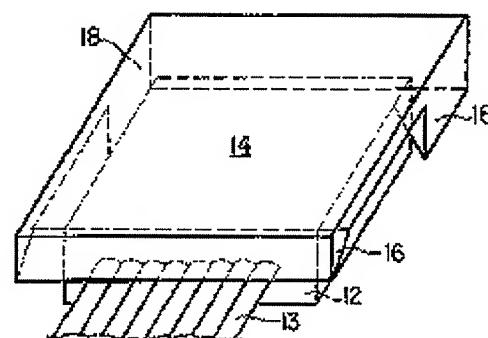
【図2】



【図3】



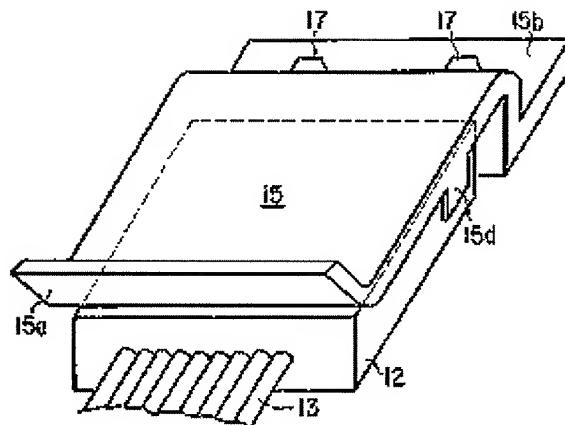
【図5】



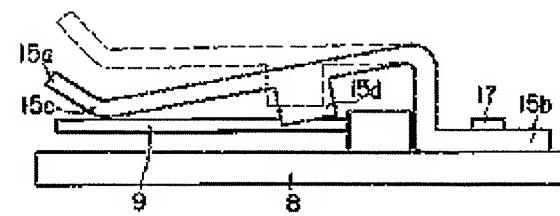
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【図6】



【図7】



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## CLAIMS

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### [Claim(s)]

[Claim 1] A housing and the liquid crystal panel with which the above-mentioned housing is equipped and which constitutes the display screen, The circuit board with which the above-mentioned liquid crystal panel is equipped in piles at the above-mentioned housing and which drives the above-mentioned liquid crystal panel, Covering attached in the above-mentioned housing so that the above-mentioned circuit board might be covered while being formed by resin, Are formed in the 1st connector attached on the above-mentioned circuit board, and the above-mentioned covering and one, and counter with the 1st connector of the above and it is located. The liquid crystal display characterized by having a regulation means to regulate migration of the 2nd connector of the above in the connection direction of the 2nd connector of the above, and the crossing direction while holding the connection condition of the 2nd connector of the above when the 2nd connector is connected to the 1st connector of the above.

[Claim 2] The above-mentioned regulation means is the liquid crystal display indicated by claim 1 characterized by having the stopper which pinches the 2nd connector of the above between the above-mentioned circuit boards while countering with the above-mentioned circuit board and being located.

[Claim 3] the 1st pawl with which the above-mentioned stopper prevents the omission from the 1st connector of the above of the 2nd connector of the above, and the connection direction of the 2nd connector of the above -- crossing -- and the above-mentioned circuit board and abbreviation -- the liquid crystal display indicated by claim 1 characterized by having the 2nd pawl of the pair which regulates migration in an parallel direction.

[Claim 4] A housing and the liquid crystal panel with which the above-mentioned housing is equipped and which constitutes the display screen, The circuit board with which the above-mentioned liquid crystal panel is equipped in piles at the above-mentioned housing and which drives the above-mentioned liquid crystal panel, Covering attached in the above-mentioned housing so that the above-mentioned circuit board might be covered, and the 1st connector attached on the above-mentioned circuit board, Are fixed to either the above-mentioned covering or the circuit board, and counter with the 1st connector of the above and it is located. While connecting with the gland of the above-mentioned circuit board, when it has conductivity and the 2nd connector is connected to the 1st connector of the above, while holding the connection condition of the 2nd connector of the above The liquid crystal display characterized by equipping the 2nd connector of the above with the 1st connector of the above, and a regulation means to flow electrically, in the condition of not connecting with the 1st connector of the above.

[Claim 5] The above-mentioned regulation means is the liquid crystal display indicated by claim 4 characterized by having the stopper which pinches the 2nd connector of the above between the above-mentioned circuit boards while countering with the above-mentioned circuit board and being located.

[Claim 6] the above-mentioned stopper -- the connection direction of the 2nd connector of the above -- crossing -- and the above-mentioned circuit board and abbreviation -- the liquid crystal display indicated by claim 4 characterized by having the pawl of the pair which regulates migration in an parallel direction.

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[Translation done.]

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Industrial Application] This invention relates to the liquid crystal display used as a display of a word processor or a personal computer.

#### [0002]

[Description of the Prior Art] In recent years, the demand of miniaturization of a word processor or a personal computer and lightweight-izing has been increasing. Thin-shape-izing of the liquid crystal display built into these equipments and lightweight-ization are needed with this demand.

[0003] Generally, the liquid crystal display equipped with a liquid crystal panel, the circuit board, the side light, the liquid crystal drive circuit, etc. in the metal outer frame, and equips the rear face with covering made of resin. Thin-shape-izing and lightweight-izing of a liquid crystal display can be advantageously attained by mounting in the circuit board by making comparatively thin lightweight TAB (Tape Automated Bonding) into a driver IC.

[0004] Moreover, on the circuit board contained in a liquid crystal display, the connector pin for supplying a liquid crystal driving signal from external equipment is prepared. The socket drawn from the external device through the flexible SHIBURUKE-bull is connected to this connector pin.

#### [0005]

[Problem(s) to be Solved by the Invention] The liquid crystal display needs to be equipped with sufficient mechanical strength to the pressure and load from the outside, while thin-shape-izing and lightweight-ization are desired. While a big load acts on a connector pin especially at the time of attachment and detachment of a socket, a big load may act through a socket and a flexible SHIBURUKE-bull after connection. And when a load is excessive, the circuit board also has a possibility of receiving damage, as well as a connector pin.

[0006] Moreover, generally the liquid crystal drive circuit contains many driver ICs for a CMOS liquid crystal drive. Therefore, there is a possibility that a driver IC may be damaged with static electricity generated during static electricity by contact of the body under activity or conveyance, and preservation.

[0007] This invention was made in view of the above point, and that purpose is to offer the liquid crystal display which can prevent breakage of the connector by the load and pressure from the outside, and a substrate while preventing breakage of the driver IC by static electricity.

#### [0008]

[Means for Solving the Problem] The liquid crystal panel with which a housing and the above-mentioned housing are equipped and which according to this invention constitutes the display screen, The circuit board with which the above-mentioned liquid crystal panel is equipped in piles at the above-mentioned housing and which drives the above-mentioned liquid crystal panel, Covering attached in the above-mentioned housing so that the above-mentioned circuit board might be covered while being formed by resin, Are formed in the 1st connector attached on the above-mentioned circuit board, and the above-mentioned covering and one, and counter with the 1st connector of the above and it is located. When the 2nd connector is connected to the 1st connector of the above, while holding the connection condition of the 2nd connector of the above, the liquid crystal display characterized by having a regulation means to regulate migration of the 2nd connector of the above in the connection direction of the 2nd connector of the above and the crossing direction is offered.

[0009] Moreover, the liquid crystal panel with which a housing and the above-mentioned housing are equipped and which according to this invention constitutes the display screen, The circuit board with which the above-mentioned liquid crystal panel is equipped in piles at the above-mentioned housing and which drives the above-

mentioned liquid crystal panel, Covering attached in the above-mentioned housing so that the above-mentioned circuit board might be covered, and the 1st connector attached on the above-mentioned circuit board, Are fixed to either the above-mentioned covering or the circuit board, and counter with the 1st connector of the above and it is located. While connecting with the gland of the above-mentioned circuit board, when it has conductivity and the 2nd connector is connected to the 1st connector of the above, while holding the connection condition of the 2nd connector of the above The liquid crystal display characterized by equipping the 2nd connector of the above with the 1st connector of the above and a regulation means to flow electrically, in the condition of not connecting with the 1st connector of the above is offered.

[0010]

[Function] According to the liquid crystal display of this invention, the 2nd connector connected to the 1st connector prepared on the circuit board is formed in covering made of wrap resin, and one in the circuit board, and migration in that connection direction and the crossing direction is regulated by the regulation means which countered the 1st connector and was attached. the 1st pawl for this regulation means to prevent the omission of the 2nd connector, and the above-mentioned direction of the 2nd connector which carries out a crossover -- and the circuit board and abbreviation -- it has the 2nd pawl of the pair which prevents migration in an parallel direction. And by pinching the 2nd connector between the circuit board and a regulation means, migration in the vertical direction of the 2nd connector was regulated, and migration to a longitudinal direction is regulated with the 2nd pawl.

[0011] Moreover, by forming a regulation means in covering and one, the load or pressure which are transmitted to the 2nd connector through a flexible SHIBURUKE-bull cannot transmit to the 1st connector directly, and breakage of the circuit board or the 1st and 2nd connectors can be prevented.

[0012] Moreover, according to this invention, a regulation means is formed with an electrical conducting material, is attached in a covering or circuit board side, and is connected to the gland of the circuit board. And a regulation means is in the condition that the 2nd connector is not connected to the 1st connector, and has the 1st connector and the structure which flows electrically. Therefore, it connects with the gland of the circuit board through the regulation means in the condition that the 2nd connector is not connected, and even if the 1st connector electrically connected to the electronic parts on the circuit board is the case where static electricity arises in the 1st connector, static electricity was not transmitted to electronic parts, consequently it has prevented breakage by static electricity of electronic parts.

[0013]

[Example] Hereafter, the example of this invention is explained to a detail, referring to a drawing. As shown in drawing 1 and drawing 2 , the liquid crystal display 1 is equipped with the metal housing 4 which constitutes the outer frame of a liquid crystal display 1. A housing 4 is equipped with the circuit board 8 and \*\* which carried the electronic parts which constitute the liquid crystal panel 2 which constitutes the display screen, the side light unit 6, and the drive circuit which drives a liquid crystal panel 2, and which are not illustrated in piles. Furthermore, on the circuit board 8, the mold 10 made of the resin as wrap covering is arranged in piles in electronic parts.

[0014] Between the circuit board 8 and a liquid crystal panel 2, TAB which is not illustrated as a driver IC is bent flexibly, and is connected. Moreover, on the circuit board 8, the connector pin 9 as the 1st connector is attached, and it is located between the circuit board 8 and mold 10. And the socket 12 as the 2nd connector can connect with the connector pin 9 along the direction of arrow-head X. The socket 12 is connected to the external device which is not illustrated as a source of supply of a driving signal through the flexible SHIBURUKE-bull 13.

[0015] If a liquid crystal driving signal is supplied to a driver IC from an external device through the flexible SHIBURUKE-bull 13, a socket 12, the connector pin 9, and electronic parts, a liquid crystal panel 2 will drive according to a driving signal, and an image will be displayed on a liquid crystal panel 2 by the transmitted light of a side light 6.

[0016] The liquid crystal display needs to be equipped with sufficient mechanical strength while thin-shape-izing and lightweight-ization are desired. Especially, a big load acts on the connector pin 9 after the time of attachment and detachment of a socket 12, or connection. Therefore, the liquid crystal display 1 of this invention is equipped with the stopper 14 as a regulation means to regulate migration of a socket 12. Hereafter, a stopper 14 is explained to a detail.

[0017] As shown in drawing 3 and drawing 4 , the stopper 14 concerning the 1st example is arranged so that it

may be formed in mold 10 and one and the connector pin 9 may be countered. A stopper 14 is in the condition which connected the socket 12 to the connector pin 9, it is formed so that the top face of a socket 12 may be contacted, and it is pinching the socket 12 between the circuit boards 8. At this time, the inferior surface of tongue of a socket 12 touches the circuit board 2, and has regulated migration in the vertical direction which intersects the connection direction X of a socket 12 by the stopper 14 and the circuit board 2.

[0018] moreover, the 1st pawl 16 for a stopper 14 to prevent the omission to the connection direction X of a socket 12, the connection direction X of a socket 12, and the crossing direction -- and the circuit board and abbreviation -- it has the 2nd pawl 18 of the pair for regulating migration in an parallel direction, i.e., a longitudinal direction. The 1st pawl 16 has prevented the omission from the connector pin 9 of a socket 12 by stopping the back end section of the socket 12 connected to the connector pin 9. Moreover, the 1st pawl 16 inclines gradually toward an outside from the inside of a stopper 14, and connection is canceled by drawing out a socket 12 by the force beyond a certain predetermined force. That is, when it has elasticity since the stopper 14 is formed from the resin ingredient, and connecting a socket 12 to the connector pin 9, or when drawing out a socket 12 from the connector pin 9, a stopper 14 is once bent and desorption of the socket 12 is carried out.

[0019] As mentioned above, by regulating migration in the direction of four directions of a socket 12 with the stopper 14 formed in mold 10 and one, the load or pressure which are given to a socket 12 from the exterior through the flexible SHIBURUKE-bull 13 cannot act on the connector pin 9 or the circuit board 8 directly, and can catch a load by the stopper 14 and the mold 10 whole of this and one. Consequently, the connector pin 9 and a load with the excessive circuit board 8 are not received, and breakage can be prevented. Moreover, by considering a stopper 14 as the configuration which forms in mold 10 and one, the production process of a liquid crystal display 1 is simplified, and a manufacturing cost is reduced.

[0020] Next, the stopper concerning the 2nd example is explained using drawing 5 thru/or drawing 7 . In addition, since the fundamental configuration is the same as the 1st example of the above, about the same part as the 1st example, explanation is omitted using the same sign, and only a different part from the 1st example is explained.

[0021] As shown in drawing 5 and drawing 6 , a stopper 15 bends conductors, such as a metal, and is formed, it \*\*\*'s to the circuit board 8, 17 is fixed, and the end face section 15b is connected to the gland of the circuit board 8. A stopper 15 is prolonged along with the connector pin 9 through the upper part of the connector pin 9 from end face section 15b, and it is bent up so that it may separate from the connector pin 9 near the point of the connector pin 9. This bending section 15c is forced in the connector pin 9 direction by the spring operation of a stopper 15. Moreover, the stopper 15 is equipped with 15d of pawls of the pair caudad projected from the side edge section.

[0022] Drawing 7 shows the side elevation which looked at the stopper 15 shown in drawing 5 from arrow-head A. In the condition (condition shown as a continuous line) that the socket 12 is not connected to the connector pin 9, bending section 15c of a stopper 15 touches the connector pin 9. Therefore, the connector pin 9 is connected to the gland of the circuit board 8 through the stopper 15.

[0023] Moreover, if a socket 12 is connected to the connector pin 9, a stopper 15 will be pushed up up, as a dotted line shows, and a socket 12 will be pinched between the circuit board 8 and a stopper 15. Since point 15a of the stopper 15 bent up guides the point of a socket 12 in case it connects, a socket 12 is easily connectable with the connector pin 9.

[0024] As mentioned above, since the socket 12 connected to the connector pin 9 is pinched between the circuit board 8 and a stopper 15, migration in the vertical direction is regulated and migration to a longitudinal direction is regulated by 15d of pawls. Moreover, by suppressing the top face according to a spring operation of a stopper 15, it is made hard to escape from and the socket 12 has regulated migration in the direction of an omission. Thus, breakage of the connector pin 9 by the load given to a socket 12 from the exterior or the circuit board 8 can be prevented by holding the connection condition of a socket 12.

[0025] Moreover, in the condition that the socket 12 is not connected to the connector pin 9, the connector pin 9 is connected to the gland of the circuit board 8 through the stopper 15. Therefore, static electricity given by contact of the body or static electricity produced during conveyance and preservation is not transmitted to a driver IC through the connector pin 9, and breakage of electronic parts, such as a driver IC by static electricity, can be prevented.

[0026] In addition, this invention deforms suitably, without changing the summary of invention, without being limited to the example mentioned above. For example, the circuit board 8 may be attached in the stopper 15 in

the 2nd example by the wrap mold 10. In this case, a stopper 15 is connected to a gland through the shielding layer formed in the inside of mold 10.

[0027]

[Effect of the Invention] According to the liquid crystal display of this invention, as explained above, where a socket is connected to a connector pin, in order to regulate migration in the connection direction of a socket, and the crossing direction, a connector pin is countered and the stopper is formed in mold and one. Therefore, it is caught by a stopper and mold, an excessive load does not act on a connector pin or the circuit board, and the load transmitted to a socket from an external device through a flexible SHIBURUKE-bull can prevent breakage of a connector pin or the circuit board.

[0028] Moreover, according to other invention, while being formed with conductors, such as a metal, it connects with the gland of the circuit board, and the stopper has the composition of contacting a connector pin in the condition that the socket is not connected to the connector pin. Therefore, when the socket is not connected, the connector pin has connected with the gland too hastily. Therefore, when static electricity told by contact of the body under activity and static electricity produced during conveyance and preservation are given to a connector pin, since it escapes to a gland through a stopper, static electricity does not reach the electronic parts mounted on the circuit board, and static electricity can prevent breakage by static electricity of electronic parts.

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**TECHNICAL FIELD**

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[Industrial Application] This invention relates to the liquid crystal display used as a display of a word processor or a personal computer.

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**PRIOR ART**

[Description of the Prior Art] In recent years, the demand of miniaturization of a word processor or a personal computer and lightweight-izing has been increasing. Thin-shape-izing of the liquid crystal display built into these equipments and lightweight-ization are needed with this demand.

[0003] Generally, the liquid crystal display equipped with a liquid crystal panel, the circuit board, the side light, the liquid crystal drive circuit, etc. in the metal outer frame, and equips the rear face with covering made of resin. Thin-shape-izing and lightweight-izing of a liquid crystal display can be advantageously attained by mounting in the circuit board by making comparatively thin lightweight TAB (Tape Automated Bonding) into a driver IC.

[0004] Moreover, on the circuit board contained in a liquid crystal display, the connector pin for supplying a liquid crystal driving signal from external equipment is prepared. The socket drawn from the external device through the flexible SHIBURUKE-bull is connected to this connector pin.

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## EFFECT OF THE INVENTION

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[Effect of the Invention] According to the liquid crystal display of this invention, as explained above, where a socket is connected to a connector pin, in order to regulate migration in the connection direction of a socket, and the crossing direction, a connector pin is countered and the stopper is formed in mold and one. Therefore, it is caught by a stopper and mold, an excessive load does not act on a connector pin or the circuit board, and the load transmitted to a socket from an external device through a flexible SHIBURUKE-bull can prevent breakage of a connector pin or the circuit board.

[0028] Moreover, according to other invention, while being formed with conductors, such as a metal, it connects with the gland of the circuit board, and the stopper has the composition of contacting a connector pin in the condition that the socket is not connected to the connector pin. Therefore, when the socket is not connected, the connector pin has connected with the gland too hastily. Therefore, when static electricity told by contact of the body under activity and static electricity produced during conveyance and preservation are given to a connector pin, since it escapes to a gland through a stopper, static electricity does not reach the electronic parts mounted on the circuit board, and static electricity can prevent breakage by static electricity of electronic parts.

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] The liquid crystal display needs to be equipped with sufficient mechanical strength to the pressure and load from the outside, while thin-shape-izing and lightweight-ization are desired. While a big load acts on a connector pin especially at the time of attachment and detachment of a socket, a big load may act through a socket and a flexible SHIBURUKE-bull after connection. And when a load is excessive, the circuit board also has a possibility of receiving damage, as well as a connector pin.

[0006] Moreover, generally the liquid crystal drive circuit contains many driver ICs for a CMOS liquid crystal drive. Therefore, there is a possibility that a driver IC may be damaged with static electricity generated during static electricity by contact of the body under activity or conveyance, and preservation.

[0007] This invention was made in view of the above point, and that purpose is to offer the liquid crystal display which can prevent breakage of the connector by the load and pressure from the outside, and a substrate while preventing breakage of the driver IC by static electricity.

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## MEANS

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[Means for Solving the Problem] The liquid crystal panel with which a housing and the above-mentioned housing are equipped and which according to this invention constitutes the display screen, The circuit board with which the above-mentioned liquid crystal panel is equipped in piles at the above-mentioned housing and which drives the above-mentioned liquid crystal panel, Covering attached in the above-mentioned housing so that the above-mentioned circuit board might be covered while being formed by resin, Are formed in the 1st connector attached on the above-mentioned circuit board, and the above-mentioned covering and one, and counter with the 1st connector of the above and it is located. When the 2nd connector is connected to the 1st connector of the above, while holding the connection condition of the 2nd connector of the above, the liquid crystal display characterized by having a regulation means to regulate migration of the 2nd connector of the above in the connection direction of the 2nd connector of the above and the crossing direction is offered.  
[0009] Moreover, the liquid crystal panel with which a housing and the above-mentioned housing are equipped and which according to this invention constitutes the display screen, The circuit board with which the above-mentioned liquid crystal panel is equipped in piles at the above-mentioned housing and which drives the above-mentioned liquid crystal panel, Covering attached in the above-mentioned housing so that the above-mentioned circuit board might be covered, and the 1st connector attached on the above-mentioned circuit board, Are fixed to either the above-mentioned covering or the circuit board, and counter with the 1st connector of the above and it is located. While connecting with the gland of the above-mentioned circuit board, when it has conductivity and the 2nd connector is connected to the 1st connector of the above, while holding the connection condition of the 2nd connector of the above The liquid crystal display characterized by equipping the 2nd connector of the above with the 1st connector of the above and a regulation means to flow electrically, in the condition of not connecting with the 1st connector of the above is offered.

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## OPERATION

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[Function] According to the liquid crystal display of this invention, the 2nd connector connected to the 1st connector prepared on the circuit board is formed in covering made of wrap resin, and one in the circuit board, and migration in that connection direction and the crossing direction is regulated by the regulation means which countered the 1st connector and was attached. the 1st pawl for this regulation means to prevent the omission of the 2nd connector, and the above-mentioned direction of the 2nd connector which carries out a crossover -- and the circuit board and abbreviation -- it has the 2nd pawl of the pair which prevents migration in an parallel direction. And by pinching the 2nd connector between the circuit board and a regulation means, migration in the vertical direction of the 2nd connector was regulated, and migration to a longitudinal direction is regulated with the 2nd pawl.

[0011] Moreover, by forming a regulation means in covering and one, the load or pressure which are transmitted to the 2nd connector through a flexible SHIBURUKE-bull cannot transmit to the 1st connector directly, and breakage of the circuit board or the 1st and 2nd connectors can be prevented.

[0012] Moreover, according to this invention, a regulation means is formed with an electrical conducting material, is attached in a covering or circuit board side, and is connected to the gland of the circuit board. And a regulation means is in the condition that the 2nd connector is not connected to the 1st connector, and has the 1st connector and the structure which flows electrically. Therefore, it connects with the gland of the circuit board through the regulation means in the condition that the 2nd connector is not connected, and even if the 1st connector electrically connected to the electronic parts on the circuit board is the case where static electricity arises in the 1st connector, static electricity was not transmitted to electronic parts, consequently it has prevented breakage by static electricity of electronic parts.

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## EXAMPLE

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[Example] Hereafter, the example of this invention is explained to a detail, referring to a drawing. As shown in drawing 1 and drawing 2, the liquid crystal display 1 is equipped with the metal housing 4 which constitutes the outer frame of a liquid crystal display 1. A housing 4 is equipped with the circuit board 8 and \*\* which carried the electronic parts which constitute the liquid crystal panel 2 which constitutes the display screen, the side light unit 6, and the drive circuit which drives a liquid crystal panel 2, and which are not illustrated in piles. Furthermore, on the circuit board 8, the mold 10 made of the resin as wrap covering is arranged in piles in electronic parts.

[0014] Between the circuit board 8 and a liquid crystal panel 2, TAB which is not illustrated as a driver IC is bent flexibly, and is connected. Moreover, on the circuit board 8, the connector pin 9 as the 1st connector is attached, and it is located between the circuit board 8 and mold 10. And the socket 12 as the 2nd connector can connect with the connector pin 9 along the direction of arrow-head X. The socket 12 is connected to the external device which is not illustrated as a source of supply of a driving signal through the flexible SHIBURUKE-bull 13.

[0015] If a liquid crystal driving signal is supplied to a driver IC from an external device through the flexible SHIBURUKE-bull 13, a socket 12, the connector pin 9, and electronic parts, a liquid crystal panel 2 will drive according to a driving signal, and an image will be displayed on a liquid crystal panel 2 by the transmitted light of a side light 6.

[0016] The liquid crystal display needs to be equipped with sufficient mechanical strength while thin-shape-zing and lightweight-ization are desired. Especially, a big load acts on the connector pin 9 after the time of attachment and detachment of a socket 12, or connection. Therefore, the liquid crystal display 1 of this invention is equipped with the stopper 14 as a regulation means to regulate migration of a socket 12. Hereafter, a stopper 14 is explained to a detail.

[0017] As shown in drawing 3 and drawing 4, the stopper 14 concerning the 1st example is arranged so that it may be formed in mold 10 and one and the connector pin 9 may be countered. A stopper 14 is in the condition which connected the socket 12 to the connector pin 9, it is formed so that the top face of a socket 12 may be contacted, and it is pinching the socket 12 between the circuit boards 8. At this time, the inferior surface of tongue of a socket 12 touches the circuit board 2, and has regulated migration in the vertical direction which intersects the connection direction X of a socket 12 by the stopper 14 and the circuit board 2.

[0018] moreover, the 1st pawl 16 for a stopper 14 to prevent the omission to the connection direction X of a socket 12, the connection direction X of a socket 12, and the crossing direction -- and the circuit board and abbreviation -- it has the 2nd pawl 18 of the pair for regulating migration in an parallel direction, i.e., a longitudinal direction. The 1st pawl 16 has prevented the omission from the connector pin 9 of a socket 12 by stopping the back end section of the socket 12 connected to the connector pin 9. Moreover, the 1st pawl 16 inclines gradually toward an outside from the inside of a stopper 14, and connection is canceled by drawing out a socket 12 by the force beyond a certain predetermined force. That is, when it has elasticity since the stopper 14 is formed from the resin ingredient, and connecting a socket 12 to the connector pin 9, or when drawing out a socket 12 from the connector pin 9, a stopper 14 is once bent and desorption of the socket 12 is carried out.

[0019] As mentioned above, by regulating migration in the direction of four directions of a socket 12 with the stopper 14 formed in mold 10 and one, the load or pressure which are given to a socket 12 from the exterior through the flexible SHIBURUKE-bull 13 cannot act on the connector pin 9 or the circuit board 8 directly, and can catch a load by the stopper 14 and the mold 10 whole of this and one. Consequently, the connector pin 9 and a load with the excessive circuit board 8 are not received, and breakage can be prevented. Moreover, by

considering a stopper 14 as the configuration which forms in mold 10 and one, the production process of a liquid crystal display 1 is simplified, and a manufacturing cost is reduced.

[0020] Next, the stopper concerning the 2nd example is explained using drawing 5 thru/or drawing 7 . In addition, since the fundamental configuration is the same as the 1st example of the above, about the same part as the 1st example, explanation is omitted using the same sign, and only a different part from the 1st example is explained.

[0021] As shown in drawing 5 and drawing 6 , a stopper 15 bends conductors, such as a metal, and is formed, it \*\*\*\*s to the circuit board 8, 17 is fixed, and the end face section 15b is connected to the gland of the circuit board 8. A stopper 15 is prolonged along with the connector pin 9 through the upper part of the connector pin 9 from end face section 15b, and it is bent up so that it may separate from the connector pin 9 near the point of the connector pin 9. This bending section 15c is forced in the connector pin 9 direction by the spring operation of a stopper 15. Moreover, the stopper 15 is equipped with 15d of pawls of the pair caudad projected from the side edge section.

[0022] Drawing 7 shows the side elevation which looked at the stopper 15 shown in drawing 5 from arrow-head A. In the condition (condition shown as a continuous line) that the socket 12 is not connected to the connector pin 9, bending section 15c of a stopper 15 touches the connector pin 9. Therefore, the connector pin 9 is connected to the gland of the circuit board 8 through the stopper 15.

[0023] Moreover, if a socket 12 is connected to the connector pin 9, a stopper 15 will be pushed up up, as a dotted line shows, and a socket 12 will be pinched between the circuit board 8 and a stopper 15. Since point 15a of the stopper 15 bent up guides the point of a socket 12 in case it connects, a socket 12 is easily connectable with the connector pin 9.

[0024] As mentioned above, since the socket 12 connected to the connector pin 9 is pinched between the circuit board 8 and a stopper 15, migration in the vertical direction is regulated and migration to a longitudinal direction is regulated by 15d of pawls. Moreover, by suppressing the top face according to a spring operation of a stopper 15, it is made hard to escape from and the socket 12 has regulated migration in the direction of an omission. Thus, breakage of the connector pin 9 by the load given to a socket 12 from the exterior or the circuit board 8 can be prevented by holding the connection condition of a socket 12.

[0025] Moreover, in the condition that the socket 12 is not connected to the connector pin 9, the connector pin 9 is connected to the gland of the circuit board 8 through the stopper 15. Therefore, static electricity given by contact of the body or static electricity produced during conveyance and preservation is not transmitted to a driver IC through the connector pin 9, and breakage of electronic parts, such as a driver IC by static electricity, can be prevented.

[0026] In addition, this invention deforms suitably, without changing the summary of invention, without being limited to the example mentioned above. For example, the circuit board 8 may be attached in the stopper 15 in the 2nd example by the wrap mold 10. In this case, a stopper 15 is connected to a gland through the shielding layer formed in the inside of mold 10.

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## DESCRIPTION OF DRAWINGS

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**[Brief Description of the Drawings]**

[Drawing 1] Drawing 1 is the exploded view showing the liquid crystal display of this invention.

[Drawing 2] Drawing 2 is the assembly drawing showing the liquid crystal display of drawing 1 .

[Drawing 3] Drawing 3 is the schematic diagram showing the connection part containing the stopper in the 1st example included in the liquid crystal display of this invention.

[Drawing 4] Drawing 4 is the schematic diagram showing the condition of holding the connection condition of a connector with the stopper of drawing 3 .

[Drawing 5] Drawing 5 is the schematic diagram showing the connection part containing the stopper in the 2nd example included in the liquid crystal display of this invention.

[Drawing 6] Drawing 6 is the schematic diagram showing the condition of holding the connection condition of a connector with the stopper of drawing 5 .

[Drawing 7] Drawing 7 is the side elevation showing the stopper of drawing 5 .

**[Description of Notations]**

1 [ -- The circuit board, 9 / -- A connector pin, 10 / -- Mold, 12 / -- A socket, 13 / -- 14 A flexible SHIBURUKE-bull, 15 / -- Stopper ] -- A liquid crystal display, 2 -- A liquid crystal panel, 4 -- A housing, 8

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[Translation done.]

## \* NOTICES \*

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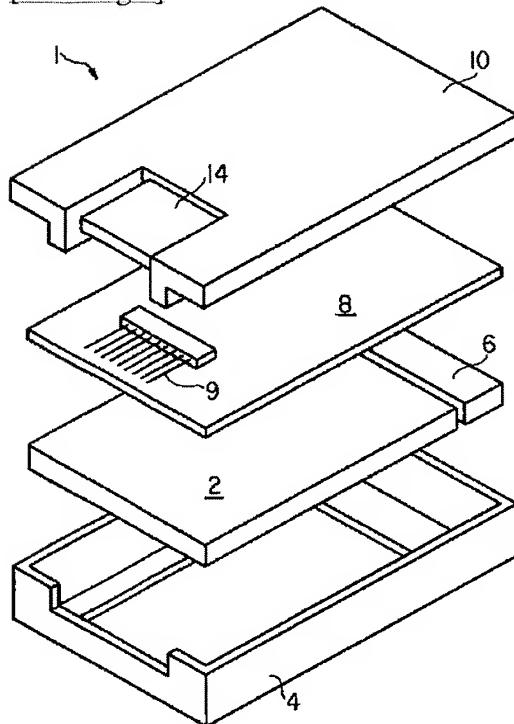
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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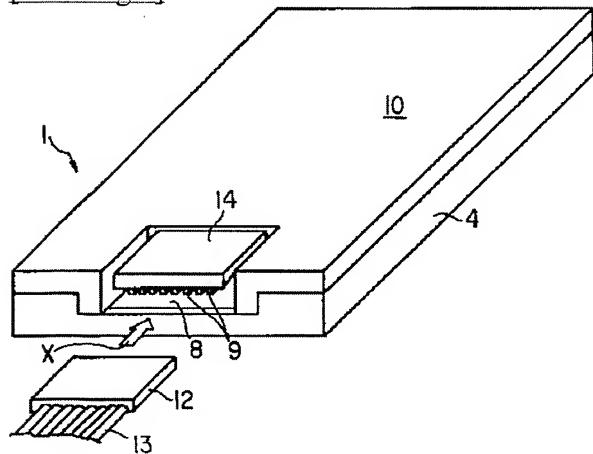
DRAWINGS

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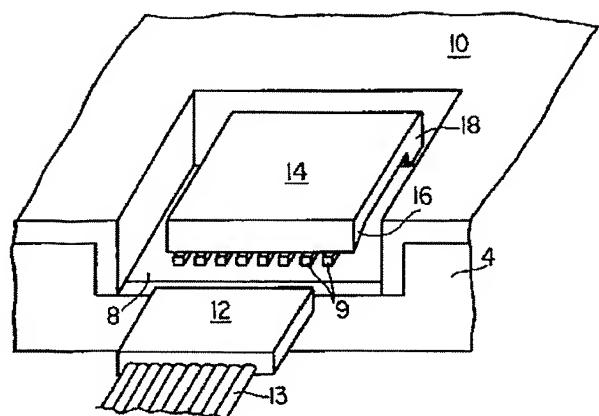
[Drawing 1]



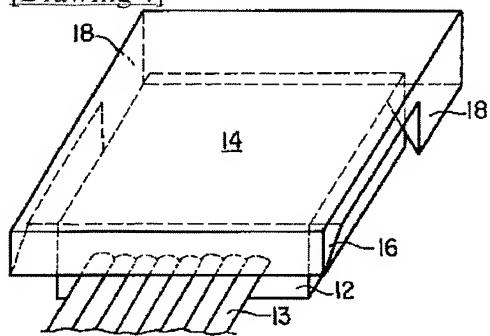
[Drawing 2]



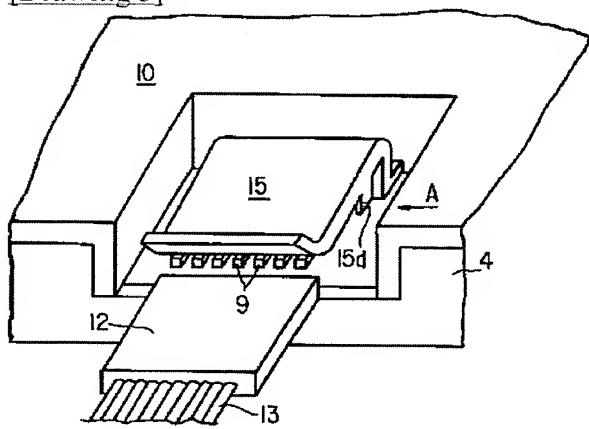
[Drawing 3]



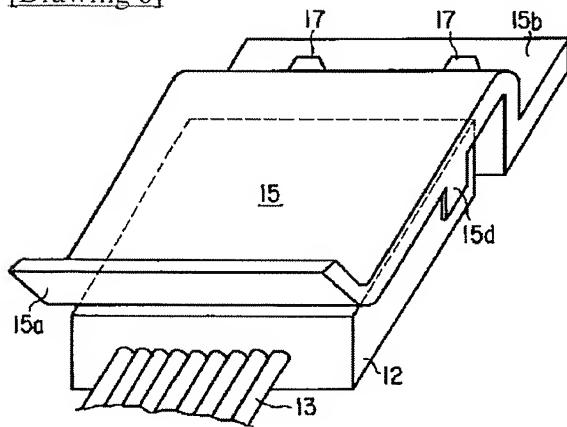
[Drawing 4]



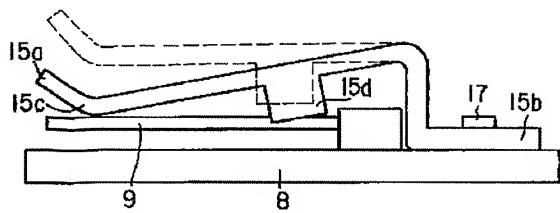
[Drawing 5]



[Drawing 6]



[Drawing 7]



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[Translation done.]